

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application : Eugene S. Rubin
Serial No. : 10/560,767
Filed : December 13, 2005
For : Anti-missile defense suite
Attorney's Docket : BAE-20030073
Examiner : Philip J. Bonzell
Group Art Unit : 3644

AMENDMENT AFTER FINAL UNDER CFR §1.116

Mail Stop AF
Commissioner of Patents
PO Box 1450
Alexandria, VA, 22313-1450

Sir:

In response to the Final Office Action dated May 6, 2010,
please amend the above-identified Patent Application as follows:

In the Claims:

1. (Previously Presented) A method for producing a decoy infrared signature to direct an incoming infrared guided missile away from an aircraft infrared signature and to the decoy infrared signature, the method comprising the acts of:

deploying a towed IR decoy during at least one aircraft flight time period including aircraft take off and aircraft landing;

powering the IR decoy by a laser source to produce a decoy infrared signature, wherein the produced laser source powered IR decoy infrared signature is of a magnitude greater than the infrared signature of said aircraft, and wherein said IR decoy infrared signature includes infrared energy in more than one spectral band;

distributing the IR decoy infrared signature by means of a plurality of optical fibers of various lengths coupled to a plurality of small apertures within the IR decoy;

detecting an incoming infrared guided missile with a warning system, and responsive to said detecting, further including the act of masking an infrared signature of at least one engine of the aircraft by causing a first amount of exhaust obscurant to be added into an exhaust stream of said at least one engine of the aircraft; and

retracting the towed IR decoy after the aircraft reaches an altitude that is beyond a range of an infrared guided missile or proximate the time immediately preceding or after the aircraft has landed.

2. (Previously Presented) The method for producing a decoy infrared signature to direct an incoming infrared guided missile away from an aircraft according to claim 1, wherein the act of retracting the towed IR decoy after take off is performed at approximately 10,000 feet.

3. (Previously Presented) The method for producing a decoy infrared signature to direct an incoming infrared guided missile away from an aircraft according to claim 1, further including deploying the towed IR decoy when the warning system has detected the incoming infrared guided missile, and retracting the towed IR decoy when the warning system is not detecting the incoming infrared guided missile.

4. (Cancelled)

5. (Previously Presented) The method for producing a decoy infrared signature to direct an incoming infrared guided missile

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away from an aircraft according to claim 1, further including the acts of: repeating the detecting act to detect the incoming infrared guided missile with the warning system; and responsive to said repeated detecting act, increasing the magnitude of the decoy infrared signature of the towed IR decoy by rapid modulation of the laser source.

6. (Previously Presented) The method for producing a decoy infrared signature to direct an incoming infrared guided missile away from an aircraft according to claim 5, further including increasing the first amount of the exhaust obscurant added into said exhaust stream of said at least one engine of the aircraft in response to said detecting act.

7. (Previously Presented) An aircraft system for producing a decoy infrared signature to direct an incoming infrared guided missile away from an aircraft infrared signature and to the decoy infrared signature, the system comprising:

- a towed IR decoy, for producing the decoy infrared signature;

- a photonic source powering a plurality of fiber optic cables, said plurality of fiber optic cables having various lengths, each varying length fiber optic cable having a terminating point a predetermined distance from a terminating point of one or more other of said plurality of fiber optic cables, for directly radiating IR energy into the atmosphere from the termination points, wherein the various lengths of fiber optic cables and distance between said termination points provides said decoy infrared signature, wherein said IR decoy infrared signature is of a magnitude greater than the infrared signature of said aircraft, and wherein said IR decoy infrared signature includes infrared energy in more than one spectral band;

- a warning system, for detecting an incoming infrared guided missile;

- an aircraft engine obscurant system, responsive to said detection of said incoming infrared guided missile from said

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warning system, for masking an infrared signature of at least one engine of said aircraft by causing a first amount of exhaust obscurant to be added into an exhaust stream of said at least one engine of the aircraft; and

a deployment and retraction device, for deploying and retracting the towed IR decoy proximate at least one time period including at least aircraft take off and aircraft landing.

8. (Previously Presented) The aircraft system according to claim 7, wherein the photonic source is a high power fiber laser.

9. (Previously Presented) The aircraft system according to claim 7, wherein the IR decoy includes a heat source.

10-13. (Cancelled)

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14. (Previously Presented) An aircraft system of an aircraft for detecting and avoiding an incoming infrared guided missile, the system comprising:

a warning system, for detecting an incoming infrared guided missile;

a towed IR decoy, coupled to a laser source within the aircraft, for producing a decoy infrared signature, said towed IR decoy coupled to said laser source within the aircraft by way of a plurality of fiber optic cables, wherein said plurality of fiber optic cables have various lengths, each varying length fiber optic cable having a terminating point a distance from a terminating point of one or more other of said plurality of fiber optic cables, for directly radiating IR energy into the atmosphere from the termination points, wherein the various lengths of fiber optic cables and distance between said termination points provides said decoy infrared signature, wherein said IR decoy infrared signature is of a magnitude greater than an infrared signature of said aircraft, and wherein said IR decoy infrared signature includes infrared energy in more than one spectral band;

a deployment and retraction device, for deploying the towed IR decoy when the warning system has detected the incoming

missile, and for retracting the towed IR decoy when the warning system is not detecting the incoming missile; and

an aircraft engine obscurant system, responsive to said detection of said incoming infrared guided missile from said warning system, for masking an infrared signature of at least one engine of the aircraft by causing a first amount of exhaust obscurant to be added into an exhaust stream of said at least one engine of the aircraft.

15. (Cancelled)

16. (Currently Amended) The aircraft system according to claim 14, wherein the exhaust obscurant includes an additive that is selected from the a group consisting of oil, graphite-oil, multispectral water or a commercial oil smoke generator.

17. (Previously Presented) The aircraft system according to claim 14, wherein said fiber optic cables at various lengths provide an extended IR signature to produce said IR decoy infrared signature.

18. (Previously Presented) The aircraft system according to claim 14, wherein the towed IR decoy includes a heat source.

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19. (Cancelled)

20. (Previously Presented) The aircraft system according to claim 14, wherein said laser source is a high power fiber laser.

21. (Cancelled)

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REMARKS

Applicant appreciates the Examiner's review of the present application and requests reconsideration in view of the preceding amendments and the following remarks. This is a complete response to the outstanding Final Office Action mailed on May 6, 2010. Claims 1-3, 5-9, 14, 16-18 and 20 were previously pending in this application. Claim 16 has been amended. As a result, claims 1-3, 5-9, 14, 16-18 and 20 are pending for examination with claims 1, 7 and 14 being independent claims. No new matter has been added.

35 USC §112

The Examiner has rejected Claim 16 under 35 USC §112 because claim 16 recites the limitation "the additive" in line 2 and there is insufficient antecedent basis for this limitation in the claim. Applicant has amended the pertinent part of the claim to recite "the exhaust obscurant includes an additive". Applicant requests reconsideration and withdrawal of the 112 rejection.

35 USC §103

The Examiner has rejected claims 1-3, 7-9, 14, 16-18 and 20 under 35 USC 103(a) as being unpatentable over Bull et al. (US Patent No. 5,136,295, hereinafter "Bull") in view of Carlson et

al. (US Patent No. 6,683,555, hereinafter "Carlson"), Czarnecki (US Patent No. 6,267,039, hereinafter "Czarnecki") and Loucks (US Patent No. 5,269,132, hereinafter "Loucks"). Applicant respectfully traverses the rejection and requests reconsideration.

Applicant asserts that the combination of Bull, Carlson, Czarnecki and Loucks fails to render Applicant's claims obvious. The Examiner states that both Bull and Carlson are silent about the decoy being infrared, however, Figure 4 of Czarnecki teaches using infrared as a heat source decoy. Applicant asserts that Czarnecki teaches away from Applicant's invention. The use of infrared in Czarnecki is seen in the placement of the infrared directly onto the aircraft or onto an appendage directly attached to the aircraft. The purpose of the invention as specifically disclosed in column 3, lines 59-61, is to sacrifice, rather than protect, a specific aircraft structure. The entire purpose and design of Czarnecki is wholly different than Applicant's invention and one who was familiar with a towed decoy would have no motivation to combine the teachings of Czarnecki with Bull and Carlson and there would have been no reasonable success in the combination. Applicant argues that one skilled in the art of deployed aircraft decoys would not even look to Czarnecki. A reason, suggestion or motivation for combining the teachings of

the references to produce the claimed invention must be present in the prior art. There is no reason, suggestion or motivation why one would combine Czarnecki that uses a missile hit acceptance strategy with Bull and Carlson, which both utilize a deployable decoy. Applicant asserts that the combination of Czarnecki with Bull and Carlson changes the principle of operation (i.e. the deployed decoy) of the primary references (Bull and Carlson), thereby rendering Czarnecki inoperable for its intended purpose.

Additionally, the Examiner concludes that Bull, Carlson and Czarnecki are silent about masking the infrared signature engine. The Examiner then refers to the abstract of Loucks, which states "The apparatus consists of a plurality of overlapping hollow panels each having a truncated cone shape supplied with a liquid coolant such that the coolant absorbs heat from the surfaces of the panels and converts the liquid to a vapor. The vapor created by this heat absorption is injected from an end opening of a panel between the panels and the exhaust gases of the jet engine to form a boundary layer." Loucks does disclose a method and apparatus for reducing the infrared emissions from a tail-pipe section of a jet engine. Applicant argues, however, that this disclosure alone is not enough to render Applicant's claims obvious. The use of an exhaust obscurant to mask an infrared

signature of an aircraft is not a new concept, but rather the use of an exhaust obscurant to mask an infrared signature in combination with a deployed infrared decoy is a novel invention. Applicant's claims would not have been possible as a result of combining the teachings of Bull, Carlson, Czarnecki and Loucks. Applicant asserts that the Examiner has failed to establish a proper rejection and failed to establish a prima facie case of obviousness. The prior art (Bull, Carlson, Czarnecki and Loucks) as a whole must contain some implicit or explicit reason, suggestion or motivation for a person of ordinary skill in the art to combine or modify the references as proposed by the Examiner. Applicant asserts that just because the reference can be combined, does not render the proposed combination obvious, as the prior art must also suggest the desirability of the combination. Here, the combination of the prior art fails to teach, motivate or suggest a reasonable expectation of success of the proposed combination. Applicant respectfully asserts that the Examiner is using impermissible hindsight as the motivation to combine the references and arrive at Applicant's claimed invention.

Applicant respectfully requests reconsideration and withdrawal of the claim 103 rejections based on Bull, Carlson, Czarnecki and Loucks. The Applicant also respectfully submits

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that Sweeney and Brum do not cure the above deficiencies.
Therefore, claims 1-3, 5-9, 14, 16-18 and 20 should be allowed
for at least the above reasons.

Prior Art Made of Record

The prior art made of record has been considered, but is not
believed to affect the patentability of the presently pending
claims.

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CONCLUSION

A Notice of Allowance is respectfully requested. The Examiner is requested to call the undersigned at the telephone number listed below if this communication does not place the case in condition for allowance.

If this response is not considered timely filed and if a request for an extension of time is otherwise absent, Applicant hereby requests any necessary extension of time. If there is a fee occasioned by this response, including an extension fee, the Director is hereby authorized to charge any deficiency or credit any overpayment in the fees filed, asserted to be filed or which should have been filed herewith to our Deposit Account Number 02-3285, under Docket Number BAE-20030073.

Respectfully submitted,

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